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EXAMINER	
BUSS, BENJAMIN J	
ART UNIT	PAPER NUMBER
2129	

DATE MAILED: 09/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/600,991	CHEN ET AL.	
	Examiner	Art Unit	
	Benjamin Buss	2129	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 June 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *13-19 and 21-25* is/are allowed.

6)☒ Claim(s) *1-12 and 20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *6/19/2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. *20060821* .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to an AMENDMENT entered 6/22/2006 for the patent application 10/600,991 filed on 6/19/2003.

The First Office Action of 3/22/2006 is fully incorporated into this Final Office Action by reference.

Status of Claims

Claims 1-25 are pending.

Priority

Examiner acknowledges Applicant's claim for priority based on PCT/US01/49193 filed on 12/19/2001, which claims priority from U.S. Provisional 60/299,002 filed on 6/19/2001 and U.S. Provisional 60/256,279 filed on 12/19/2000.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-4, 10-12, and 20 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The computer system must set forth a practical application of that §101 judicial exception to produce a real-world result. Benson, 409 U.S. at 71-72, 175 USPQ at 676-77. The invention is ineligible because it has not been limited to a substantial practical application. Mere selection and abstract manipulation of data is useless in a real world situation.

In determining whether the claim is for a "practical application," the focus is not on whether the steps taken to achieve a particular result are useful, tangible, and concrete. If the claim is directed to a practical application of the §101 judicial exceptions producing a result tied to the physical world that does not preempt the judicial exception, then the claim meets the statutory requirement of 35 U.S.C. §101.

The claimed invention manipulates data, but does not produce a tangible useful, concrete, and tangible real-world result that can be perceived by the senses.

The invention must be for a practical application and either:

1) specify transforming (physical thing – article) or

2) have the Final Result (not the steps) achieve or produce a

useful (specific, substantial, AND credible),

concrete (substantially repeatable/non-unpredictable), AND

tangible (real world/non-abstract) result

(tangibility is the opposite of abstractness).

A claim that is so broad that it reads on both statutory and non-statutory subject matter must be amended, and if the specification discloses a practical application but the claim is broader than the disclosure such that it does not require the practical application, then the claim must be amended.

Claims that select and manipulation abstract data, such as models and parameters, are not statutory. Examiner suggests that Applicant add the limitation "**processing actual logging signals from the selected tool with the trained neural network to produce a log of the earth parameter**" to the independent claims, since this clearly constitutes a useful, concrete, and tangible result associated with a substantial practical application.

Appropriate corrections are required.

Response to Arguments

Applicant's arguments filed 6/22/2006 have been fully considered but they are not persuasive. Applicant argues that:

> The Examiner has rejected claims 1-25 under 35 USC §101, asserting that the claimed invention is directed to non-statutory subject matter. In particular the Examiner asserts that the claim invention is not a practical application that produces useful, concrete, and tangible results and that the claimed invention manipulates data, but does not produce a tangible, useful, concrete, and tangible real-world result that can be perceived by the senses. The Applicants traverse these rejections because the Examiner fails to make a *prima facie* showing that the claimed invention lacks utility as required by MPEP 2107.02. The Examiner has failed to provide any evidentiary basis far the rejection and has not provided a detailed explanation why the claimed invention has no specific and substantial credible utility as required by that section.
>
> All of the claims include specific statements of substantial practical purpose of the present invention. For example, claim 1 is for "Apparatus far converting the output signals of a logging tool into a log representing a parameter of earth formations surrounding borehole..." The remaining claims recite apparatus and methods for essentially the same purpose.
>
> Well logs are physical displays or representations of characteristics of earth formations surrounding a borehole. Such logs are very useful to oil explorationists and drillers so that they can understand the parameters of the formations, such as mineral content, pressure, temperature, etc. and drill safe productive wells. It is well blown that the direct outputs of logging tools, called

> the raw data, is not normally in a form that can be understood by log analysts and reservoir engineers. It normally must be improved and converted into a clear representation of the desired parameter, e.g. resistivity versus depth location. Apparatus and methods for producing such user readable logs are clearly patentable subject matter.
>
> Claim 1 is directed to an improved tool far converting raw data into such a log. Claims 2-25 are directed to similarly useful apparatuses and methods. Fox at least this reason, claims 1-25 clearly meet the requirements of 35 USC §101.

Examiner agrees that no *prima facie* showing that the claimed invention lacks utility has been made. The claims were not rejected as lacking utility, but as being directed to non-statutory subject matter. To be statutory, claims must be for a practical application and either:

1) specify transforming (physical thing – article) or

2) have the Final Result (not the steps) achieve or produce a

useful (specific, substantial, AND credible),

concrete (substantially repeatable/non-unpredictable), AND

tangible (real world/non-abstract) result (tangibility is the opposite of abstractness).

Examiners statement that the claims to not produce a useful, concrete, AND statutory result stands because the rejected claims do not produce a tangible result, but rather merely manipulate abstract data. Applicant can overcome this outstanding rejection by amending the claims to include a limitation specifically showing a meaningful result (such as a well log) output such that a user (such as a log analyst) can use it. Merely being capable of such an output does not make the claims statutory. The useful AND concrete AND statutory result that is produced must be claimed.

Examiner points out that the rejection of claims 5-9, 13-19, and 21-25 as non-statutory has been withdrawn because the independent claims (5, 13, and 21) do claim a useful, concrete, and tangible result in the limitation reading "**processing actual logging signals from the selected tool with the trained neural network to produce a log of the earth parameter**". The rejection of claims 1-4, 10-12, and 20 under 35 U.S.C. as non-statutory stands.

95 ***Claim Rejections - 35 USC § 112***

Response to Arguments

Applicant's arguments, see pages 11-13, filed 6/22/2006, with respect to the rejections under 35 U.S.C. §112, first paragraph have been fully considered and are persuasive. The rejection of claims 4-6, 13, 16, and 21-22 as lacking enablement has been withdrawn.

100

Claim Rejections - 35 USC § 112

Response to Arguments

Applicant's arguments, see page 13, filed 6/22/2006, with respect to the rejections under 35 U.S.C. §112, second paragraph have been fully considered and are persuasive. The rejection of claims 1, 5, 10, 13,

105 16, and 20-22 as being indefinite has been withdrawn.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

110 A person shall be entitled to a patent unless –
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

115 Claims 1-3 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by **Mezzatesta** (USPN 5,862,513).

Claim 1:

Mezzatesta anticipates:

120 - an artificial neural network trained with a set of synthetic earth formation models selected to cover the operating range of a selected logging tool based on sensitivity and resolution limits of the logging tool and based on realistic ranges of formation parameters (C3-9 especially C3:25-C6:35 and C7:30-60 and C9:35-55; Also see Figure 1A).

Claim 2:

Mezzatesta anticipates:

- said logging tool output signals are a series of samples each representing the signal at a depth point in said borehole (C3-9 especially C3:64-C4:3 and C8:65-C9:20; Also see Figures 4A, 4B, and 4C), and
- said neural network has a plurality of inputs receiving the samples from a range of depths in the borehole and one output representing the parameter at a depth point within the range of depths (C3-9 especially C3:35-C4:35 and C5:3-10 and C8:65-C9:20; Also see Figures 2 and 4C).

Claim 3:

Mezzatesta anticipates:

- said logging tool output signals are a series of samples each representing the signal at a depth point in said borehole (C3-9 especially C3:64-C4:3 and C8:65-C9:20; Also see Figures 4A and 4B), and
- said neural network has a plurality of inputs receiving the samples from a range of depths in the borehole and a plurality of outputs representing the value of the parameter at a plurality of depth points within the range of depths (C3-9 especially C3:35-C4:35 and C5:3-10 and C8:65-C9:20; Also see Figures 2 and 4C).

Claim 5:

Mezzatesta anticipates:

- creating a set of synthetic earth formation models selected to cover the operating range of a selected logging tool based on sensitivity and resolution limits of the logging tool and based on realistic ranges of formation parameters (C3-9 especially C3:25-C6:35 and C7:30-60 and C9:35-55);
- generating synthetic responses of the selected tool to each of the formation models (C3-9 especially C3:25-C6:35 and C7:30-60 and C9:35-55);

- using the synthetic responses and the formation models to train an artificial neural network to generate representations of formation models in response to the synthetic responses (C3-9 especially C4:63-C6:26; Also see Figures 1A and 1B); and
- processing actual logging signals from the selected tool with the trained neural network to produce a log of the earth parameter (C3-9 especially C6:5-31).

Response to Arguments

Applicant's arguments filed 6/22/2006 have been fully considered but they are not persuasive. Applicant argues that:

> Mezzatesta does not teach any preferred ranges of an earth model, much less use of a synthetic earth model having the characteristics of claim 1, for training a neural network. The input model of Mezzatesta is intended to match the actual earth formation being measured, that is they are based on an estimated actual earth formation. See Col. 3, lines 9-40. In contrast, claim 1 requires that the characteristics of synthetic earth models be based on characteristics of the tool, not any real earth formation, much less one that is currently being measured and processed. For at least this reason, Applicants submit that independent claim 1 and its dependent claims 2-3 are patentable over Mezzatesta.
>
> As to claim 5, the Examiner asserts that Mezzatesta anticipates: "creating a set of synthetic earth formation models selected to cover the operating range of a selected logging tool based on sensitivity and resolution limits of the logging tool and based on realistic ranges of formation parameters" citing Columns 3-9, especially Col. 3, line 25 to Col. 6, line 35 and Col. 9, lines 35-55. The Applicants respectfully traverse this rejection. It is clear as discussed above that Mezzatesta does not teach creating synthetic earth models having such characteristics based on the tool in question. Mezzatesta instead teaches creating an estimate of actual earth formations through which a real logging tool has been operated and has generated tool responses, i,e. raw logging data. For at least this reason, Applicants submit that independent claim 5 is patentable over Mezzatesta.

Examiner disagrees. **Mezzatesta** does not require that the model used to train the ANN consist of data from a real earth formation, much less one that is currently being measured and processed. **Mezzatesta** discloses an earth model "produced that includes synthetic rather than raw data" (**Mezzatesta** C7:30-60). **Mezzatesta** also discloses that the system/method results "in a stable and accurate earth model for predicting formation parameters where actual raw logging data has not been obtained; Such systems which may be used at a well site or at a location remote from the well site; and Such systems and methods which use various different wellbore logging tools which process various types of wellbore logging data, which utilize a trained ANN, and which provide a set of synthetic tool responses" (**Mezzatesta** C6:25-35). Additionally, **Mezzatesta** discloses that the synthetic data used to produce this synthetic model is based on known earth formations (**Mezzatesta** C7:30-60) in the same manner that

Applicant states in ¶57 of the Instant Application that one of the "basic earth models used in the preferred embodiment ... is referred to as an Oklahoma type formation because it is similar to real earth formations which occur in Oklahoma." **Mezzatesta** further discloses that these synthetic models generated are based on data from "a particular tool in various earth formations" (**Mezzatesta** C7:30-60), therefore the model inherently takes the operating range of the tool into account. The broadest reasonable interpretation of **Mezzatesta** does anticipate "an artificial neural network trained with a set of synthetic earth formation models selected to cover the operating range of a selected logging tool based on the sensitivity and resolution limits of the logging tool and based on realistic ranges of formation parameters". The rejection of claims 1-3 and 5 under 35 U.S.C. §102 as anticipated by **Mezzatesta** stand.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Mezzatesta** (USPN 5,862,513) in view of **Freedman** (USPN 5,210,691).

Claim 4:

Mezzatesta fails to teach:

- means for combining the outputs of said neural network to generate an average value for each depth point in the borehole.

Freedman teaches:

- means for combining the outputs of said neural network to generate an average value for each depth point in the borehole (C3-17 especially C13:66-C15:35).

Motivation:

Mezzatesta and **Freedman** are from the same field of endeavor, borehole logging. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of **Mezzatesta** by combining the neural network outputs representing the earth parameter at varying depth in a way that resolves the data as taught by **Freedman** for the benefit of providing improved inversion and better resolution (**Freedman** C15:20-35).

Response to Arguments

Applicant's arguments filed 6/22/2006 have been fully considered but they are not persuasive. Applicant argues that:

> Claim 4 has been rejected as being unpatentable over Mezzatesta in view of Freedman US patent 5,210,691. Claim 4 depends from claim 1, and Illus incorporates the limitations of claim 1. Mezzatesta fails to teach or suggest each element of claim 1 as explained previously. The examiner does not cite, any teachings or suggestions in Freedman regarding neural networks, let alone the limitations of claim 1. Claim 4 additionally requires combining different outputs of a neural network to generate an average value for each depth point in the borehole, which is clearly not taught by either Mezzatesta or Freedman. For at least these reasons, claim 4 is patentable over these references, taken individually or in combination.

Examiner disagrees. **Mezzatesta** teaches "an artificial neural network trained with a set of synthetic earth formation models selected to cover the operating range of a selected logging tool based on the sensitivity and resolution limits of the logging tool and based on realistic ranges of formation parameters" as detailed above. **Freedman** combines data from different depths for better resolution (**Freedman** C15:20-35). The person of ordinary skill in the art at the time of the invention would have found it obvious to combine the outputs of the ANN to produce such an average, since there is nothing novel about combining outputs of an ANN and it is routinely done by adding a single node output layer to the output of the ANN, the node performing the average. The rejection of claim 4 under 35 U.S.C. §103 as unpatentable over **Mezzatesta** and **Freedman** stands.

Claim Rejections - 35 USC § 103

Claims 6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Mezzatesta** (USPN 5,862,513) in view of **Anderson** (USPN 3,954,006).

Claim 6:

Mezzatesta teaches:

- using the synthetic responses and the formation models to train one or more additional artificial neural network or networks to generate representations of the formation models in response to the synthetic responses (C3-9 especially C4:63-C6:26; Also see Figures 1A and 1B);
- processing the actual logging signals from the selected tool with the additional trained neural network or networks to produce an additional log or logs of the earth parameter (C3-9 especially C6:5-31); and,

Mezzatesta fails to teach:

- combining the logs of the earth parameter to produce a composite log of the earth parameter.

Anderson teaches:

- combining the logs of the earth parameter to produce a composite log of the earth parameter (C4-18 especially C8:65-C9:55 and Figures 2C, 4C, 6C, and 10C).

Motivation:

Mezzatesta and **Anderson** are from the same field of endeavor, borehole logging. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of **Mezzatesta** by combining the logs of the earth parameter to create a composite log as taught by **Anderson** for the benefit of making it so the viscosity of well bore fluids are not a factor in determining the fluid velocities (**Anderson** C9:40-55).

Claim 9:

Mezzatesta teaches:

- wherein the artificial neural network has a plurality of outputs, each providing an output corresponding to a different depth point in the borehole (C3-9 especially C3:35-C4:35 and C5:3-10 and C8:65-C9:20; Also see Figures 2 and 4C);

Mezzatesta fails to teach:

- combining the plurality of outputs according to borehole depth points to produce a log of the earth parameter.

Anderson teaches:

- combining the plurality of outputs according to borehole depth points to produce a log of the earth parameter (C4-18 especially C8:65-C9:55 and Figures 2C, 4C, 6C, and 10C).

Motivation:

Mezzatesta and **Anderson** are from the same field of endeavor, borehole logging. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of **Mezzatesta** by combining the logs of the earth parameter according to depth points to create a composite log as taught by **Anderson** for the benefit of making it so the viscosity of well bore fluids are not a factor in determining the fluid velocities (**Anderson** C9:40-55).

Response to Arguments

Applicant's arguments filed 6/22/2006 have been fully considered but they are not persuasive. Applicant argues that:

> Claims 6 and 9 have been rejected under 35 USC § 303(a) as being unpatentable over Mezzatesta in view of Anderson US patent 3,954,006. These claims depend from claim 5 and thus incorporate the limitations of claim 5. Mezzatesta fails to teach or suggest: each element of claim 5 as explained previously. The examiner does not cite, and applicants cannot find, any teaching or suggestions in Anderson regarding neural networks, let alone the limitations of claim 5. Claim 6 additionally requires the use of multiple neural networks, which is clearly not taught by either. Mezzatesta or Anderson. Claim 9 additionally requires combining different outputs of a neural network to generate an average value for each depth point the borehole, which is clearly not taught by either Mezzatesta or Anderson For at least these reasons, claims 6 and 9 are patentable over these references, taken individually or in combination.

Examiner disagrees. **Mezzatesta** teaches "an artificial neural network trained with a set of synthetic earth formation models selected to cover the operating range of a selected logging tool based on the sensitivity and resolution limits of the logging tool and based on realistic ranges of formation parameters" as detailed above. **Mezzatesta** also teaches the use of multiple neural networks, specifically "producing a first trained artificial neural network, then producing a first output set of synthetic tool responses for the well logging tool with the first trained artificial neural network, and inputting to a second artificial neural network both the input earth model training set and the first output set of synthetic tool responses for the well logging tool" (**Mezzatesta** C5:10-35) and "producing a second trained ANN including comparing the wellbore logging data to the synthetic tool responses of a secondary output model produced by the second trained artificial neural network" (**Mezzatesta** C5:35:55) and "further training the second trained artificial neural network producing a tertiary trained artificial neural network and producing therewith a

tertiary output model that includes a set of tertiary synthetic tool responses" (**Mezzatesta** C5:55:65) and "again training the tertiary artificial neural network producing a fourth artificial neural network" (**Mezzatesta** C5:65:67). The first, second, tertiary, and fourth artificial neural networks of **Mezzatesta** clearly teach the use of multiple neural networks. **Anderson** teaches combining outputs according to depth interval to create a composite log (C9:35-55). The person of ordinary skill in the art at the time of the invention would have found it obvious to combine the outputs of the ANN, since there is nothing novel about combining outputs of an ANN and it was common practice in the art at the time of the invention. Applicant's argument that claim 9 requires generation of an "average value for each depth point" misses the claimed subject matter, as the claim actually requires the generation of "a log of the earth parameter". The rejection of claims 6 and 9 under 35 U.S.C. §103 as unpatentable over **Mezzatesta** and **Anderson** stands.

Claim Rejections - 35 USC § 103

Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Mezzatesta** (USPN 5,862,513) in view of **Barber** (USPN 5,184,079).

Claim 7:

Mezzatesta fails to teach:

- wherein the selected logging tool is an induction logging tool having more than one transmitter receiver pair and the synthetic responses from the selected tool include responses from more than one transmitter receiver pair.

Barber teaches:

- wherein the selected logging tool is an induction logging tool having more than one transmitter receiver pair and the synthetic responses from the selected tool include responses from more than one transmitter receiver pair (C1-17 especially C1:13-60 and C8:60-C920).

Motivation:

Mezzatesta and **Barber** are from the same field of endeavor, borehole logging. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings

of **Mezzatesta** by producing the synthetic logging responses using an induction logging tool having more than one transmitter receiver as taught by **Barber** for the benefit of obtaining a desired response (**Barber** C1:48-51).

Claim 8:

Mezzatesta fails to teach:

- wherein the selected logging tool is an induction logging tool having both in-phase and quadrature output signals and the synthetic responses from the selected tool include both signals.

Barber teaches:

- wherein the selected logging tool is an induction logging tool having both in-phase and quadrature output signals and the synthetic responses from the selected tool include both signals (C1-17 especially C1:13-60 and C8:60-C920; Also see Figure 13a).

Motivation:

Mezzatesta and **Barber** are from the same field of endeavor, borehole logging. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of **Mezzatesta** by producing the synthetic logging responses using an induction logging tool including both in-phase and quadrature output signals as taught by **Barber** for the benefit of providing sufficient information concerning the existence, depth location, quantity, et., of oil and gas trapped in the formations (**Barber** C1:12-34).

Response to Arguments

Applicant's arguments filed 6/22/2006 have been fully considered but they are not persuasive. Applicant argues that:

> Claims 7 and 8 have been rejected under 35 USC 103(a) as being unpatentable over Mezzatesta in view of Barber US patent: 5,184,079, These claims depend from claim 5 and thus incorporate the limitations of claim 5. Mezzatesta fails to teach or suggest each elernent of claim 5 as explained previously. The examiner does not cite any teachings or suggestions in Barber of neural networks, let alone the limitations of claim 5, For at least this reason, claims 7 and 8 are patentable aver these references, taken individually or in combination.

Examiner disagrees. **Mezzatesta** teaches "an artificial neural network trained with a set of synthetic earth formation models selected to cover the operating range of a selected logging tool based on the sensitivity

and resolution limits of the logging tool and based on realistic ranges of formation parameters" as detailed above. The rejection of claims 7 and 8 under 35 U.S.C. §103 as unpatentable over **Mezzatesta** and **Barber** stands.

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Claim Rejections - 35 USC § 103

Response to Arguments

Applicant's arguments, see pages 15-17, filed 6/22/2006, with respect to the rejections of claims 10-25 have been fully considered and are persuasive. The rejections of claims 10-25 under 35 U.S.C. §103
380 have been withdrawn.

Allowable Subject Matter

The following is a statement of reasons for the indication of allowable subject matter: Claims 13-19 and 21-25 are considered allowable since when reading the claims in light of the specification, as per MPEP
385 §2111.01 or In re Sneed, 710 F.2d 1544, 1548, 218 USPQ 385, 388 (Fed. Cir. 1983), none of the references of record alone or in combination disclose or suggest the combination of limitations specified in the independent claims including training an artificial neural network with a plurality of chirp models synthetic earth formation models and a plurality of Oklahoma type synthetic earth formation models such that: at least one chirp model has an upper parameter limit substantially at the upper limit of the operating
390 range of the selected logging tool; at least one chirp model has a lower parameter limit substantially at the lower limit of the operating range of the selected logging tool; at least one Oklahoma type model has an upper parameter limit substantially at the upper limit of the operating range of the selected logging tool; and at least one Oklahoma type model has a lower parameter limit substantially at the lower limit of the operating range of the selected logging tool (supported at e.g., ¶¶57-62), as specified in claims 13 and
395 21. The Examiner was persuaded by the arguments filed.

The closest prior art (Mezzatesta USPN 5,862,513, Strickland USPN 5,867,806, Barber USPN 5,184,079, and Mills USPN 5,536,938) teaches processing well logging data using an artificial neural network, the existence of chirp models and Oklahoma type models, and the existence of earth formations of various contrasts, but fails to teach the combination of limitations specified in the independent claim

including training an artificial neural network with a plurality of chirp models synthetic earth formation models and a plurality of Oklahoma type synthetic earth formation models such that: at least one chirp model has an upper parameter limit substantially at the upper limit of the operating range of the selected logging tool; at least one chirp model has a lower parameter limit substantially at the lower limit of the operating range of the selected logging tool; at least one Oklahoma type model has an upper parameter limit substantially at the upper limit of the operating range of the selected logging tool; and at least one Oklahoma type model has a lower parameter limit substantially at the lower limit of the operating range of the selected logging tool. Therefore, the claimed invention provides a novel training method for an artificial neural network used in processing actually well logging data signals to produce a log an earth parameter.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Chapin (USPN 5,821,413)
- Howard, Jr. (USPN 5,019,978)
- Koller (USPN 4,937,747)
- Neff (USPN 6,289,285)
- White (USPN 4,852,067)
- Wiener (USPN 5,251,286)
- Mills (USPN 5,536,938)
- Taner (USPN 6,374,185)
- Zhang (USPN 6,381,542)

Claims 1-12 and 20 are rejected.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Benjamin J. Buss whose telephone number is 571-272-5831. The examiner can normally be reached on M-F 9AM-5PM.

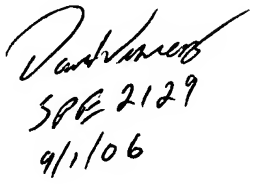
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Vincent can be reached on 571-272-3080. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Benjamin J. Buss

Examiner

Art Unit 2129



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